

WE CLAIM:

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1. An implantable medical catheter comprising:

a proximal end having an opening for fluid containing a therapeutic drug,

a distal end, the distal end defining at least one opening, and

a drug delivery segment, implantable for more than twenty-four hours, at the opening

5 defined by the distal end,

the drug delivery segment having a longitudinal axis and a length of about 0.1-1.0 cm along its longitudinal axis, and having an outside surface and an inside surface, the drug delivery segment defining tubes that extend radially from the inside surface to the outside surface, wherein the ratio of the length of the tubes extending between the inside surface and the outside surface to the diameter of the tubes is about 5-25, the drug delivery segment capable of providing fluid containing a therapeutic drug to a target site at a rate of about 2 microliter/hour to 10 microliters/minute.

2. The medical catheter of claim 1 wherein the ratio of the length of the tubes to the diameter of the tubes is about 5.0.

3. The medical catheter of claim 1 wherein the length of the drug delivery segment is about 0.5 cm.

4. The medical catheter of claim 1 wherein the tubes defined by the drug delivery segment are laser or ion beam drilled tubes.

5. The medical catheter of claim 1, the drug delivery segment defining a lumen along its longitudinal axis, and wherein the outside surface has an outside diameter and the inside

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~~surface has an inside diameter, the tubes extending radially from the inside diameter to the outside diameter.~~

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a2 6. The medical catheter of claim 1 wherein the inside surface of the drug delivery segment has a diameter of about 0.32 inches, the outside surface of the drug deliver segment has a diameter of about 0.64 inches, and the tubes defined by the drug delivery segment have a length of about 0.16 inches.

7. The medical catheter of claim 1 wherein the number of tubes defined by the drug delivery segment is about forty.

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B5 8. The medical catheter of claim 1 wherein the tubes defined by the drug delivery segment comprise at least one row parallel to the longitudinal axis of the drug delivery segment, the row having a proximal tube, a middle tube and a distal tube.

9. The medical catheter of claim 8 wherein the tubes defined by the drug delivery segment comprise four rows along the longitudinal axis of the drug delivery segment.

10. The medical catheter of claim 8 wherein the row comprises ten tubes.

11. The medical catheter of claim 8, wherein the tubes are equally spaced from each adjacent tube in the row.

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a3 12. The medical catheter of claim 9 wherein each row is about 90 degrees from each adjacent row along the outside surface of the drug delivery segment.

13. The medical catheter of claim 1 wherein the number of tubes defined by the drug delivery segment is about eighty.

Sub B7 14. The medical catheter of claim 8 wherein the tubes defined by the drug delivery segment comprise eight rows along the longitudinal axis of the drug delivery segment.

Sub B7 15. The medical catheter of claim 14 wherein each row is about 45 degrees from each adjacent row along the outside surface of the drug delivery segment.

16. The medical catheter of claim 8 wherein the distance from the proximal tube to the distal tube of the row is about 5.5 millimeters, and the distance from the middle tube of the row to the distal end of the lumen of the drug delivery segment is about 5.0 millimeters.

Sub B9 17. The medical catheter of claim 1 wherein the tubes range in diameter size from about 0.001 to 0.005 inches.

18. The medical catheter of claim 1 wherein the tubes number about 20 to 100 tubes.

19. The medical catheter of claim 1 wherein the drug delivery device comprises a radiopaque material.

20. The medical catheter of claim 1 wherein the catheter comprises at least one portion comprising a radiopaque material from the group consisting of tantalum, tungsten, titanium, gold, platinum, iridium, silver, nickel and alloys thereof.

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The medical catheter of claim 20 wherein the portion comprising a radioopaque material is a band or bead to identify the location of the drug delivery segment within a patient using X-ray, magnetic resonance imaging, or computerized axial tomography.

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22. The medical catheter of claim 1 wherein the tubes are tapered as they extend from the outside surface of the drug delivery segment to the inside surface of the drug delivery segment.

23. The medical catheter of claim 1 wherein the tubes are non-tapered as they extend from the outside surface of the drug delivery segment to the inside surface of the drug delivery segment.

24. The medical catheter of claim 1 wherein the tubes have substantially the same diameter.

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as 25.

A method for delivering a therapeutic drug comprising:
forming a drug delivery segment having a longitudinal axis, the drug delivery segment having an outside surface and an inside surface,

forming tubes in the drug delivery segment that extend radially from the inside surface of the drug delivery segment to the outside surface of the drug delivery segment, and where the ratio of the length of the tubes to the diameter of tubes is about 5-25;

providing a therapeutic drug to the drug delivery segment for more than 24 hours, and
distributing the therapeutic drug in approximately equal amounts through the tubes defined in the drug delivery segment.

26. The medical catheter of claim 25 wherein the ratio of the length of the tubes to the diameter of the tubes is about 5.

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27. The method of claim 25, wherein the step of forming tubes in the drug delivery segment comprises laser or ion beam drilling to form the tubes.

Sub a7 28. The method of claim 25 wherein the step of forming tubes in the drug delivery segment results in forming tubes that taper as they extend from the outside surface of the drug delivery segment to the inside surface of the drug delivery segment.

29. The method of claim 25 wherein the step of forming tubes in the drug delivery segment results in forming tubes that are non-tapered as they extend from the outside surface of the drug delivery segment to the inside surface of the drug delivery segment.

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